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STUDIES ON MINERALS PICTURE IN THE BLOOD SERA OF EGYPTIAN SHEEP (With Two Tables)

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(Received at 26/8/1992)

دراسات عن صورة المعادن في مصل دم الأغنام

عصمان الصيغه، ثروت غبصالعال

شملت هذه الدراسة عدد ١٢٠ رأس من الأغنام البلديه والتابعه لمزرعة الحواتكه بأسيوط ، ترلوححت أعمارها بين تسعة أشهر الى خمس سنوات . تم الكشف الاكلينيكي والمعملي على جميع الحيوانات للتأكد من حالتها الصحيه وقسمت الحيوانات الى ذكور واناث والتي قسمت بدورها الى اناث ناضجه وحديثه الولاده وحوامل وعند سن البلوغ . تم قياس معدلات المعادن شامله الصوديوم والبوتاسيوم والكلورايدات والكالسيوم والفسفور والماغنسيوم والنحاس والزنك والحديد والمولبيدينيم والمنجنيز في مصل دم الأغنام وتم اجراء التحليلات الاحصائيه المختلفه للمناسر ومدى تأثير العوامل الفسيولوجيه عليها .

SUMMARY

A total number of 120 balady sheep - their ages varied from nine months to five years old-belonged to El-Hawatka farm, Assiut Governorate constituted the material of this work. Animals proved to be healthy by both clinical and laboratory methods of examinations. Animals are classified into male and female groups. Female animals are divided into adults, recent parturated, at late stage of pregnancy and at puberty. Blood sera were collected from each animal to estimate the macro-elements including sodium, potassium, chloride, calcium, phosphorus and magnesium levels. Also estimation of micro-elements including copper, zinc, iron,

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molybdenum and manganese levels were carried out to evaluate the influence of both sex and reproductive status upon both macro and micro-elements in sheep blood.

INTRODUCTION

Research during the past few decades has shown that marginal deficiencies or imbalances in mineral are of equal or even greater importance for the both productivity and economy of animal husbandary in many parts of the world. Such borderline conditions are for more difficult to detect and hence to correct than a manifestation deficiency since they often do not provoke any significant clinical signs (WEGGER, 1980).

Pregnancy and parturition performed the main physiological events that occur in mother animals during its productive life. During pregnancy the foetus depends entirely upon its dam for supply of the nutrients. Analysis of the blood should reflect the nutritional provision for the foetus and also throw light on feed requirement of dam during gestation puerium (EL-NAGGAR, 1975).

Sheep industry is the major part of animal production particularly in arid and semi-arid areas which represents more than 90% of the Egyptian land (TAWFIK and DIGHEDY, 1980).

The requirement of sheep for the major elements vary according to their ages and weights as well as being affected to a large extent by factors such as stage of pregnancy or lactation and fetal number or level of milk production (AGRICULTURAL RESEARCH COUNCIL, 1980).

Trace elements play an important role in both nutritional and reproductive conditions in domesticated animals. The effect of trace elements on Egyptian sheep was partly studied (FAHMY, 1971; EL-HETW, *et al.* 1975; ABDEL-AZIZ, 1979; ABDEL-ALL, 1983 and MOHAMED, 1986 and many others).

Since sheep represented a high percentage of animal production in upper Egypt. For this the aim of the present investigation is to study the norms of macro and micro-elements in blood sera of sheep and their influence by different physiological conditions.

MATERIAL and METHODS

A total number of 120 balady sheep their ages varied from nine months to five years old- belonged to El-Hawatka farm, Assiut Governorate constituted the material of this study. All animals were proved to be healthy by both clinical and laboratory methods of examinations. Classification of animals was performed according to their reproductive conditions as shown in table 1.

Blood samples were collected from each animal through jugular vein puncture and the clear non haemolysed sera were collected and analysed biochemically for sodium, potassium, chloride, calcium, phosphorus, magnesium, copper, zinc, manganese, molybdenum and iron levels.

Blood serum sodium and potassium levels were estimated using Flame-photometer (Corning 400) and the chloride level was determined using chloride analyser model 925. Meanwhile blood serum calcium, phosphorus and magnesium levels were estimated using test-kits supplied from Biomerieux (Bains/France) and after the methods of GINDLER and KING (1972); MORINAL and PROX (1973) and GINDER and HETH (1971) respectively.

Also the gained blood sera were analysed for zinc, iron, copper and manganese levels using FMD3 - atom-absorption spectrophotometer in Soil and irrigation Dept., Faculty of Agriculture, Assiut University. Atomic absorption spectrophotometer equipped with boiling air acetylene and nitrous oxide acetylene burners and recorder read out.

Blood serum molybdenum was determined according to the methods of SENDELE (1944).

Statistical analysis of data were performed according to the methods of KALTON (1967).

RESULTS

Mean values and standard deviations of blood serum macro and micro-elements are illustrated in table 2.

DISCUSSION

Biochemical analysis of blood serum can provide a remarkable and valuable informations about metabolic profiles. The concentration of minerals and metabolites in the blood varies with different periods of pregnancy, parturition and puperium.

Blood serum electrolytes (Na, K, & Cl) levels in examined sheep showed a non-significant variations except the highly significant ($P < 0.01$) elevation in blood serum sodium level in sheep at late stage of pregnancy. The obtained values of blood serum electrolytes levels coincided with those previously obtained by COLES (1986); DUNCAN and PRASSE (1986) and SCHALM (1986) in ovine blood.

Elevation of blood serum sodium level at late stage of pregnancy can be attributed to hormonal factor which affect the retention of water, with consequente of sodium level (COLES, 1986) or may be attributed to the fact that sodium level in the blood serum was influenced by a thermoenvironmental factor (MANUTA, *et al.* 1984).

Close inspection of the obtained data in table 2 for the mean values of blood serum calcium, phosphorus and magnesium levels revealed a non-significant variation between sex and reproductive status. The obtained data lies within the normal levels previously obtained by BAYAZEED, *et al.* (1976); COLES, (1986); DUNCAN and PRASSE (1986) and SCHALM (1986) and MOHAMED (1986).

A non-significant variation in blood serum zinc level during variuos physiological status was evident, except a significnat ($P < 0.05$) decrease was observed in sheep at late stage of pregnancy. Such decrease can be referred to the presence of hormonal changes which occured at that period (UNDERWOOD, 1971). The recorded data of blood serum zind agreed with those previously obtained by UNDERWOOD (1971); ABDEL-AZIZ (1979) and FAHMY (1980) in sheep blood.

A highly significant ($P < 0.01$) elevation in blood serum copper level in sheep at puberty and those recently parturated was observed. Blood serum copper levels in other groups showed a non-significant variations. The obtained date coincided with those previously obtained gby ABDEL-AZIZ, 1979; EL-HETW, 1976; FAHMY, *et al.* 1980; IBRAHIM, 1980; ABDEL-ALL, 1983 and HOHAMED, 1986).

Variation in serum copper level during physiological status can be explained according to the postulate mentioned by SPRAY and WIDDOWSON (1951) where newborn and very young animals are normally richer in copper per unit of body weight than adults of the same species.

A non significant variations in blood serum iron, molybdenum and manganese levels during various physiological status were recorded. The recorded levels were in general agreement with those previously obtained by

FAHMY (1980) and ABDEL-ALL (1983) in sheep blood.

Finally the study give an information about the normal levels of both macro and micro-elements in sheep blood and also, the effect of reproductive status upon studied parameters.

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Table 1 : Classification and physiological status of examined balady sheep

Place of sampling	Sex			
	Male	Female		
El-Hawatka Farm	20	At puberty	Parturated	Adults
		20	22	28
				30

Parturated : Since one month (mother)

Pregnant : Late stage of pregnancy

Adults : Parturated 3 to 5 times

Table 2 : Mean values and standard deviation of blood serum macro- and microelements in examined sheep

Parameters	Sex			
	Male		Female	
	At puberty	Late stage pregnancy	recently parturated	Adult (2-3 times)
Sodium (mmol/L)	146.2 ± 20.5 ^a	161.3 ± 33.6 ^{ab}	134.8 ± 34.3	121.1 ± 23.9
Potassium (mmol/L)	6.3 ± 1.4	6.9 ± 0.36	5.8 ± 1.8	5.4 ± 1.3
Chloride (mmol/L)	88.2 ± 2.6	93.3 ± 6.1	92.5 ± 9.5	90.9 ± 7.8
Calcium (mg %)	8.2 ± 2.01	10.4 ± 0.88	8.49 ± 1.4	10.8 ± 1.5
Phosphorus (mg %)	3.4 ± 1.2	5.9 ± 1.02	4.8 ± 1.3	6.6 ± 1.1
Magnesium (mg %)	2.3 ± 0.6	3.1 ± 0.8	2.8 ± 0.6 ^a	2.7 ± 0.87
Zinc (mg %)	142.8 ± 33.4	95.4 ± 22.03 ^a	128.3 ± 23.5	125.5 ± 25.3
Copper (µmol/L)	20.48 ± 2.8	25.0 ± 7.0	28.4 ± 3.4 ^{ab}	20.5 ± 2.8
Manganese (ug %)	1.4 ± 1.1	2.9 ± 0.6	2.5 ± 0.6	3.7 ± 1.9
Molybdenum (µmol/L)	3.06 ± 0.3	4.43 ± 0.4	3.9 ± 0.15	4.25 ± 0.22
Iron (µmol/L)	21.5 ± 3.1	25.5 ± 1.86	25.8 ± 7.77	21.6 ± 0.28

^a : Significant (P < 0.05)^{ab} : Highly significant (P < 0.01)